U.S. Antarctic Marine Living Resources Program

2010-2011 Weekly Field Reports
R/V Moana Wave

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After taking on supplies, and trading out several scientists, the R/V Moana Wave departed Punta Arenas on February 13 at 0800 for Leg 2 of the 2010/11 survey. The goals of this Leg are to deploy a new electronic opening and closing net system to monitor both plankton and mesopelagic fishes. This goal is part of AMLRs focus over the next five years to quantify the role of mesopelagic fishes in the ecosystem in Area 48.1. The net is an OpenSeas Inc. 4.0 m^2 3 net system (Tucker trawl) with two 505 micron nets and 1 5mm mesh net, a CTD to measure water properties during the tow and an oxygen sensor to better describe environmental conditions during the deep tows.

Meteorology, Oceanography and Technical Support

The Northeasterlies that predominated during the Drake Passage crossing and the survey area averaged 15 to 20knots across the 13 Tucker Trawl and IKMT stations, but built to above 30 knots on Saturday 19th, accompanied by water being taken over the transom. This necessitated that the Moana Wave head for shelter in the lee of Elephant Island. In the lee, 30 to 40knots, gusting above 50knots was experienced, but the vessel was able to hold anchor in relatively calm waters.

After an initial learning period, bug solving, and a few email queries to the manufacturer, the Tucker Trawl electronics and software worked well. The deployment and retrieval procedures set in place by the deck operators resulted in the delicate electronics of the Tucker Trawl being protected and no major damage resulted across 13 trawl stations, even in bad weather.

On the whole, from a technical aspect, the Tucker Trawl mechanics and electronics worked well and the nets seem to be flying as they should be.

Acoustics

Acoustics are being recorded on four frequencies during the survey and will be integrated with the net tow data, as time permits. With luck, acoustic targets and net data will overlap sufficiently to relate the acoustic signatures with the haul data. No formal biomass estimate is planned for the Area at the present time.

National Marine Fisheries Service
Southwest Fisheries Science Center

Gear Comparison Study

At 12 stations over the last three days, both the IKMT (~2.5m^2, 505micron) and the Tucker Trawl (4.0m^2, 505 micron mesh) nets were compared at 6 stations that were repeatedly sampled (day and night). At each station the IKMT was fished from the surface to 170m and then towed to the surface (double oblique). The Tucker trawl was fished in a similar manner, but as the net reached 170m on the descending portion of the tow, that net was closed and a second net was opened to fish from 170m to the surface. Although the numbers are low and subject to change as new data will be added, preliminary data show that the abundance of the dominant, passive plankton species (*Salpa thompsoni*) were higher in the Tucker trawl than the IKMT. We had hypothesized that there should be no difference in volume adjusted abundance, as this taxa cannot swim out of the way of these nets. This suggests that the size and design of the Tucker Trawl is more efficient than the design of the IKMT. Smaller zooplankton tended to have the same pattern among nets as the Salps, further supporting this efficiency idea. Active swimmers like Antarctic krill showed a very different pattern. Abundance of krill was order of magnitude lower in the descending portion of the Tucker Trawl, and the IKMT, compared to the ascending net of the Tucker trawl. This indicates that the krill are actively avoiding the nets on the descent to 170 meters, and that the Tucker Trawl is significantly more effective at capturing krill during active retrieval.

Length frequency data from krill captured in both the Tucker trawl and the IKMT showed similar ranges with krill between 22 and 57 mm in length. The distribution of krill captured in the Tucker Trawl was unimodal and skewed to a peak at ~36mm. The IKMT was more platykurtic with several larger individuals in the high 40 and low 50mm length bins.

Meso-Pelagic Fish Study

During the first week of the second leg of the survey, intercalibration between IKMT and Tucker trawl was done in the epipelagic layer in the vicinity of Clarence Island. Only one deep haul to 500 m was achieved.

Five species of Myctophids were identified from the 29 specimens caught. In general, specimens were in good condition to observe photophores for the determination of the species. Only one Protomyctophum was in bad condition but we were able to compare it with the other specimen collected. The dominant species are: Electrona antarctica (8 individuals), Gymnoscopelus braueri (7), Gymnoscopelus nicholsi (7), Electrona carlsbergi (5), and Protomyctophum bolini (2). 6 fish were collected with IKMT, the rest of them with the Tucker trawl. These species except E. carlsbergi were listed by Pusch et al. (2004) north of King George Island. All fishes were collected only during night and transition time. None were collected during day-time which is consistent with the vertical migration behavior of these species. The two individuals of Protmyctophum bolini were collected with the deep hauls. All fish were measured (SL in cm): Electrona antarctica (7.84+/- 1.90), Electrona carlsbergi (7.98+/- 0.41), Gymnoscopelus braueri (10.70+/- 2.01); Gymnoscopelus nicholsi (14.59 +/- 0.76) and Protomyctophum bolini (4.5 and 5.3).

Staging of sexual maturity was done on most of them but, for the moment we are only confident with Electrona antarctica. Protomyctophum bolini sex was obtained by looking at sexual dimorphism linked to the presence of infracaudal luminous organs. Otoliths were taken on 18 fish using stereomicroscope, both otoliths were taken on 12 specimens; one for the remaining ones.

Diets were determined on 27 fish, percentage of vacuity is: Electrona antarctica (62.50%), Electrona carlsbergi (25.00%), Gymnoscopelus braueri (42.86%) and Gymnoscopelus nicholsi (14.29%). Diet contents were determined by planktonologists onboard: euphausiids (not identifiable to species), amphipod (Vibilia antarctica), ostracods, Limacina helicina and copepods (Metridia gerlachei, Rhincalanus gigas, Calanus propinquus, Paraeuchaeta spp.) were identifiable in the guts. Metridia gerlachei is the most numerous prey, by numbers.

Only 3 different types of fish larvae were found in the samples for a total number of 13 specimens. The most frequent species was *Lepidonotothen kempi* found on 19% of hauls followed by *Lepidonotothen larseni* (5%) and Myctophid unidentified larvae found on 2,7 % of all samples. The specimens were collected mainly within the IKMT trawl samples or the Tucker net #3 (505µm mesh size pulled from 170m depth to the surface); only one record out of 8 was made in the Tucker #1 net (505µm mesh size towed from the surface to 170m depth). Length range for *L. kempi* was between 10.1 mm and 15 mm in Standard Length, while *L. larseni* ranged between 12,4 and 14 mm (SL).

Seabirds and Marine Mammals

Daily monitoring of seabird and marine mammal distribution and abundance continued across the Drake Passage and within the AMLR study area this week. A total of 60 transects representing 29.6 hours of survey effort surveyed 510 nautical miles of trackline during the transit. Approximately 130 nautical miles of survey effort was obtained during 15 hours of observations on nine transects between sampling stations. Eighteen species of seabirds and four species of marine mammals were detected on these transects. Of the 1520 seabirds, 28% were Cape Petrel, followed by Antarctic Fulmar (18%), Black-bellied Storm-Petrel (17%) and Chinstrap Penguin (15%). Very few Black-browed and Gray-headed Albatrosses were seen; meanwhile, White-chinned Petrel numbers were higher than usual—both trends apparent on Leg 1. Fin Whale concentrations were found west of Clarence Island and north of Elephant Island. On 16 February there were 13 Fin Whale sightings totalling approximately 40 individuals north of Elephant Island, where expected. Unexpected was an immature Parasitic Jaeger just west of Clarence Island, an immature Magellanic Penguin in the southern Drake Passage and an adult Northern Royal Albatross far south at 59°47' South Latitude.

Technical Problems and Solutions

Problems were experienced with both sea-cables. The CTD (Leg 1) and IKMT were deployed from the starboard side winch (Rochester .322" coax cable) and the Tucker Trawl on the port side winch (Rochester .450" coax cable).

Both cables displayed the tendency of having excess "spring" in them and wanting to coil back on themselves, unravel and eventually kink. The .322" cable started unraveling and eventually kinked on three occasions during Leg 1 and twice on Leg 2. This necessitated that the cable be cut back and the mechanical deadend and electrical underwater dead-end be re-terminated. This also occurred on the .450" cable on 13th Tucker Trawl (500m deep tow). As soon as the tension was released from the cable on retrieval, it sprung back on itself and coiled and kinked on the winch drum.

Various causes for this were explored:

- Exceeding working load of cables
- CTD or nets spinning underwater
- Deadends not gripping both layers of armor
- Kinking due to pinching damage in A-frame moving parts
- Kinking due to hooking on ship protrusions when A-frame moving
- Cable not being layered smoothly on winch drum
- Exceeding minimum specified bending radius of cable (9")
- Chaffing on blocks
- Cables spooled onto drums from wrong end (??)

No definite solution has been found, but it is noted that both the hanging blocks on the aft A-frame are less than the minimum cable bending radius of 9".

Importantly, there is a finite number of re-terminations possible with the deadends. As these terminations consist of four mechanical parts that are stressed on each removal and installation cycle.

The Chelsea Aquatracka fluorometer was repaired with spares parts received in port, and it was fitted to the CTD. Upon startup the Chelsea Instrument worked flawlessly. A Sea-Bird SBE-43 dissolved oxygen sensor and larger TC duct pump (SBE-5T) were added to the Tucker Trawl's Sea-Bird SBE-19 plus CTD.

The Guildline Portasal salinometer could not be repaired after it showed signs of instability on Leg 1. Emails to the manufacturer did not help as they call for the replacement of the main PCB and conductivity cell, which is the "heart" of the machine and most difficult to setup and calibrate properly.

It was noticed that the barometer in the WeatherPak that was installed at the beginning of Leg 2 was reading too high. The spare WeatherPak was rigged to also read into the SCS so that its barometer could be logged.

Submitted by the Chief Scientist of the US AMLR oceanographic survey